DOCUMENT RESUME

ED 188 792 PS 011 604

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TITLE Factor Analysis of a Behavioral Checklist Applied to Preschool Children in Hawaii.
PUB DATE May 80
NOTE 18p.: Paper presented at the meetings of the Western Psychological Association (Honolulu, HI, 1980).

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Behavior Problems: Check Lists: Communication Problems: Emotional Problems: *Factor Structure: Intervention: Learning Problems: *Preschool Children: Psychomotor Skills: *Screening Tests: Test Interpretation

ABSTRACT

A checklist developed in the Hawaii State Department of Health was completed by teachers and aides to screen for behavioral problems of children in preschools. The 31 items were categorized conceptually into four areas: (1) Speech-hearing-language: (2) Academic-intellectual: (3) Physical-motor: and (4) Social-emotional. If two or more items were checked in any of the first three categories, a child was referred for further screening. This report presents the orthogonal dimensions of principle component factor analysis with varimax rotation on 688 preschoolers referred for further screening on the island of Oahu in Hawaii. Thirty-nine preschools, from a wide range of socioeconomic and ethnic circumstances, were involved. Eleven factors with an eigenvalue of 1.0 or greater accounted for 57.7% of the cumulated variance. These 11 factors were memory-comprehension, emotions, poor vocabulary, lacking energy, distractible-disruptible, fidgety-hyperactive, inarticulate, social problems, poor persistence, clumsiness, and peer dislike. The factor names, the percentage of variance accounted for by each one, the items contributing to the factors, and the factor loadings are displayed in tables. Tentative recommendations, compiled by four clinical psychologists, are given for treatment of each of the 11 factors. (Author/SS)

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FACTOR ANALYSIS OF A BEHAVIORAL CHECKLIST APPLIED TO PRESCHOOL CHILDREN IN HAWAII

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ABSTRACT

A checklist developed in the Hawaii State Department of Health was completed by teachers and aides to screen for behavioral problems of children in preschools. The 31 items were categorized conceptually into four areas: (1) Speech-hearing-language; (2) Academic-intellectual; (3) Physical-motor; and (4) Social-emotional. If there were two or more items checked in any of the first three categories, a child was referred for further screening. This report presents the orthogonal dimensions of principle component factor analysis with varimax rotation on 688 preschoolers referred for further screening on the island on Oahu in Hawaii. Thirty-nine preschools from a wide range of socioeconomic and ethnic circumstances were involved. Eleven factors with an eigenvalue of 1.0 or greater accounted for 57.7% of the cumulated variance. The factor names their percentage of variance explained, the items contributing to the factors, and the factor loadings of the factors are displayed in Tables. Only one item contributed significantly to the two factors 8 and 9.

The Hawaii State Department of Health has a Preschool Screening Program to screen children in preschools for developmental lags and behavioral problems. The description of this program has been covered in other works (Rosco, 1980)*. The screening program used a teacher-completed Behavioral Checklist (Perry, E., 1976) to detect problems in four areas: (1) Speech-hearing-language; (2) Academic-intellectual; (3) Physical-motor; and (4) Social-emotional. Some of our other work has described the problems of children checked as having particular developmentally-oriented problems and how these problems are related to social/emotional problems (Rosco, et al, 1979, 1980).

The intent of this study was to find groups of variables which would imply some underlying or consolidating dimensions of behavioral problems, specify the relative importance of variables within these dimensions, then make initial recommendations as to what intervention techniques could be used in some common instances for these problems.

* Rosco, David R.: Preschool screening in Hawaii. Educational Perspectives: Journal of the College of Education, University of Hawaii, 18(4), Dec. 1979, 3-7.

** Rosco, David R., Perry, William B., and McLaughlin, Dennis G.:
Overall view of a preschool screening program: Implications for pediatricians, educators, and mental health workers. Paper presented at Hawaii Psychological Association, Honolulu, October 1979.

**Perry, William B.; Rosco, David R.; McLaughlin, Dennis G.:
Associated of social-emotional and behavioral problems with developmental problems. Presented at the Western Branch of the American Psychological Association, Honolulu, Hawaii, 1980.

Figure 1: Behavioral Checklist Used for Screening Preschoolers

NAME_____ BIRTH DATE_____

BEHAVIORAL CHECKLIST

Please circle all the items which describe this child's behavior.

SPEECH-HEARING-LANGUAGE

1. Does not speak English or is bilingual.
2. Speech is scanty, excessively non-verbal.
3. Speaks in isolated words or sentence fragments, but not in complete sentences.
4. Baby talk: often unintelligible.
5. Many errors of articulation.
6. Stutters or blocks on words.
7. Can't follow a set of directions given orally when other children can.
8. Only hears, understands or remembers certain parts of verbal direction - usually the last part, but sometimes the first.
9. Gives foolish or inappropriate answers to questions. Tells incoherent stories.
10. Misbehaves, wiggles or disrupts the class when language is introduced - such as story time, or listening to verbal material.
11. Slow progress shown in growth of vocabulary, or ability to express himself.

ACADEMIC-INTELLECTUAL

12. Very poor listening ability; seems not to pay attention at all.
13. Attention shifts rapidly; easily distracted.
14. Listens but does not understand; requires constant re-instruction or simplification
15. Seems not to remember anything; forgets instructions as well as rote lesson materials.
16. Little or no utilization of feedback; continues to use ineffective methods after experience or example of better methods; cannot be swayed.
17. Poor persistence, usually gives up quickly.

PHYSICAL-MOTOR

18. Does not have ordinary endurance; tires very easily.
19. Very frail physically.
20. Usually clumsy, stumbling or jerky in body coordination.
21. Does poorly in manual tasks.
22. Tempo very slow, deliberate or dawdling.
23. High-strung, tense.
24. Fidgety with nervous mannerisms.
25. Hyperactive, motions always quick.

SOCIAL-EMOTIONAL

26. Keeps to himself; overly shy or withdrawn.
27. A complete follower; seems not to have any ideas of his own.
28. Children actively avoid or attack him.
29. A very uncooperative child.
30. Poor relations with adults: complains, cannot accept or give affection; aggressive; seeks excessive attention or in inappropriate ways such as crying, causing trouble, etc.
31. Usually antagonistic, fearful or irritated.
32. Adjusts poorly to anxiety, disappointment or strain; becomes aggressive; cries long or loudly; requires excessive reassurances; seem to have feelings hurt much too easily; unduly moody.
33. Poor self-concept; lacks self-confidence.

In terms of overall functioning, this child seems to be: (Circle one)
(1) Above average (2) Average (3) Below average

11/75
VHD

METHODOLOGY

Context

The Hawaii Department of Health Preschool Screening Program was established in 1975 to detect developmental and/or social-emotional problems in preschool-enrolled children. The developmental screening program is under the Maternal and Child Health Branch of the Family Health Services Division and the social-emotional screening is conducted under the auspices of the Children's Mental Health Services Branch of the Mental Health Division. The two programs work together in a coordinated screening venture for the Hawaii State Department of Health.

The report discusses the results of the first, large scale phase of the expanding screening program and some implications of screening which could be of use to pediatricians, psychologists, educators, and others involved in services to young children.

The preschools whose data is reported in this study were all located on the island of Oahu, which contains approximately 80% of the total population of the state of Hawaii. The children screened were in both "preschools" with academic work and "day-care centers" with some or no academic work.

Subjects

There were 688 preschoolers on the island of Oahu in Hawaii who were referred for further screening on the basis of an initial checklist completed by teachers and aides. Preschoolers were referred from thirty-nine preschools from a wide range of socio-economic and ethnic circumstances.

Instruments

The thirty-four item Behavioral Checklist, (originally assembled by Dr. Ethel Perry, Ph.D., a consultant psychologist of Honolulu, Hawaii, while she was Chief Psychologist of the Family Health Services Division,) was filled out on each child by his or her teacher. See Figure 1. If the child received two or more checks indicating a problem in any of

three problem categories, the child was referred for further screening. The developmental checklist categories were: (1) Speech-hearing-language, (2) Academic-intellectual, and (3) Physical-motor. There was also a Social-emotional category which was not used for referral. An additional scale required the teacher to rate the child as above-average, average, or below-average overall.

Once a child was referred through normal procedures , that child received a 30 minute, individually administered assessment of his (1) Gross Motor skills, (2) Fine Motor skills, (3) Concept knowlege, and (4) Communications abilities. This objectively scored developmental screening test is called the Developmental Indicators to the Assessment of Learning (D.I.A.L.) (Mardell and Goldenberg, 1972).

Other information collected consisted of such factors as chronological age, sex, and school name and other behavioral ratings not used in this analysis. "Yes/No" decisions were made as to referral for further evaluation in the psychological or speech-language fields, for comprehensive diagnostic evaluations through the child devcelopment clinics (CDC's) or learning disability clinics (LDC's), or for mental health follow-up.

Analysis

An orthogonal factor analysis with varimax rotation was done in order to determine relatively independent factors. An eigenvalue of 1.0 was used in determining the number of factors to be rotated.

RESULTS AND DISCUSSION

There were 688 cases available for the factor analysis: A principle component analysis with varimax rotation yielded eleven factors with an eigenvalue of 1.0 or greater accounting for 57.5% of the cumulated variance.

Eleven problem factors found in order were: memory-comprehension, emotions, poor vocabulary, lacking energy, distractable-disruptable, fidgety-hyperactive, inarticulate, social problems, poor persistenance, clumsiness, and peer dislike. See Table of Factors.

The resulting eleven factors, their factor, name, percentage of variance accounted for by the factors, the items contributing to the factors, and the factor loading of the items could be seen in Tables 1 to 11 presented in order of percentage of variance explained. Below the statistics characterizing the factors are tentative recommendations by four clinical psychologists for treating the problems described by the factors. It will show only 2 or 3 factors as an example of recommendations.

This usage of factor analysis to identify independent problem types can assist in establishing a foundation for prescribing clinical techniques as is done here. The advantages that accrue are the similar problems can be consolidated empirically, that independent therapists can suggest techniques which together form a relatively comprehensive approach to problem therapy, that the listing of therapy techniques leads towards standards of care and operational manuals for therapists, teachers, parents, etc. depending on the problem, and that specification of techniques leads to detailing of manpower and time needed for treating of populations.

This study represents the first stage of a series of applications of factor analysis to various populations in order to form a comprehensive detailing of problems and solutions to problems.

Table 1. FACTOR 1: MEMORY-COMPREHENSION

FACTOR NAME	PERCENTAGE OF VARIANCE	CONTRIBUTING ITEMS	FACTOR LOADINGS
Memory--comprehension	18.8	Needs simplification	.61
		Incomplete understanding	.61
		Oral direction problems	.54
		Forgetful	.52
		Non utilization of feedback	.29

RECOMMENDATIONS FOR TREATING DEFICITS IN MEMORY-COMPREHENSION

1. Start with assessment of hearing, cultural impact on language, IQ, have preschool observations, and have consultations with teachers and parents regarding understanding of deficits and clarity of communication.

2. Environmental recommendations might be:

   a) teacher is to have structure, simplification and repetition

   b) teacher is to sit close to child and have eye contact when giving instructions

   c) have child repeat instructions and agree he will do that

   d) teachers is to go through sample problem solving with child

   e) set up memory aids for child

   f) provide directions in modes other than oral: e.g., visual

   g) considered child for 1 to 1 or other special assistance

3. Behavioral modification recommendations might be:

   a) teacher is to follow through with appropriate consequences e.g., child is to be praised for correct response or improvement

   b) teacher is to discuss consequences on non-completion

Table 2. FACTOR 2: EMOTIONAL PROBLEMS

FACTOR NAME	PERCENTAGE OF VARIANCE	CONTRIBUTING ITEMS	FACTOR LOADINGS
Emotional problems	17.9	Complains aggressive or cires	.66
		Uncooperative	.63
		Fearful or irritated--antagonistic	.53
		Unduly moody anxious	.44

RECOMMENDATIONS FOR TREATING EMOTIONAL PROBLEMS

1. Start with assessment by physical exam, preschool observation, family and teacher interviews.

2. Set up behavioral modification program with child to reinforce non-complaining, non-aggressive behavior, and to reinforce cooperative behavior.

   Environmental changes might be to:

   a) provide models for cooperative, unfearful behavior;

   b) involve child in activities which enhance feelings of competence and confidence;

   c) and provide one-to-one supportive therapeutic relationships working within the family.

3. Have teacher working on building a positive and caring relationship with the child: e.g., (a) greet the child warmly the first thing in the morning; (b) spend more time than usualy helping him make transition from home to school, particularly on Mondays and after holidays; (c) look for positive behavior and improvement and make comments to child about them; (d) help child develop sense of belonging by encouraging peer relationships, perhaps by using Magic Circle in the classroom.

Table 3. FACTOR 3: POOR VOCABULARY

FACTOR NAME	PERCENTAGE OF VARIANCE	CONTRIBUTING ITEMS	FACTOR LOADINGS
Poor vocabulary	12.6	Slow vocabulary growth	.62
		Non verbal	.59
		Fragmentary speech	.51
		Baby talk	.29

RECOMMENDATIONS FOR TREATING A POOR VOCABULARY

1. Start with assessment of speech, culture, IQ, and physical health.

2. Refer to speech therapist if child needs articulation training.

3. Apply operant techniques: (a) Reinforce (praise) appropriate speech, shape speech through reinforcing of improved speech requiring gradual improvement for speech for further rewards; (b) ignore inappropriate or incorrect speech; (c) use materials below child's capacity giving the child a chance for success, then gradually increase task difficulty to age-appropriate verbalizations.

4. Structure the environment: (a) Arrange for 1 to 1 or small group language stimulation using a teacher's aides, students, volunteers, or family; (b) read to child and (c) verbally label items in the environment with child at school and at home.

Table 4. FACTOR 4: ENERGY LACK

FACTOR NAME	PERCENTAGE OF VARIANCE	CONTRIBUTING ITEMS	FACTOR LOADINGS
Energy lack	9.1	Tires easily	.77
		Physically frail	.39
		Slow tempo	.32

RECOMMENDATIONS FOR TREATING LACK OF ENERGY

1. Start with assessment of physical health by pediatrician, developmental profile, dietary patterns, family habit patterns (e.g., late hours or requirements put on child by home and school) to determine appropriateness of demands and provisions for adequate rest and nutrition.

   Given adequate physical health, nutrition, and rest expose child to heavy dose of favorite activities and observe child during different periods of day to determine if there is a change in energy level display. The slow tempo may be a normal pace for this child.

2. Given that the child is adequately nourished, rested, and that the slow tempo is not his normal pace, the lack of energy might be due to depression, which might be treated as an emotional problem (see Factor II recommendations and determine cause of depression, if possible) or direct behavioral modification can be used by reinforcing activities a child can already or will do then gradually phasing in a program of activities which require more effort.

Table 5. FACTOR 5: DISTRACTING AND DISRUPTING BEHAVIOR

Factor Name	Percentage of Variance	Contributing Item	Factor Loading
Distractable/disruptive Behavior	6.9	Easily distracted	.68
		Disruptive during language	.65
		Poor listening skills	.59

RECOMMENDATIONS FOR TREATING DISTRACTING AND DISRUPTING BEHAVIOR

1. Start with assessment of hearing, physical health, cultural background, classroom observation, and IQ. Given that hearing capabilities, physical health and IQ are adequate, and that there are no classroom disturbances or social relationships that explain lack of attention and that the cultural background would not prevent attention, behavioral modification and other techniques can be applied.

2. Some behavioral modification techniques that could be tried are: (a) attending to child during periods when he is behaving appropriately and ignoring him at other times; (b) using "time-out" for disruptive behavior; (c) arrange a contingency - contract where an agreement is established in which appropriate behavior with stated predetermined limits of deviation will be rewarded and possibly inappropriate, nonproductive, or disruptive behavior will be punished; and (d) reinforce other social skills.

3. Start with achievable, rewarding goals by ensuring that the materials provided are appropriate for the child and not too difficult as to be punishing.

Table 6. FACTOR 6: FIDGETY-HYPERACTIVE BEHAVIOR

Factor Name	Percentage of Variance	Contributing Item	Factor Loadings
Fidgety-hyperactive	5.5	Fidgety	.58
		Tense	.58
		Hyperactive	.37

RECOMMENDATIONS FOR TREATING FIDGETY, TENSE AND HYPERACTIVE BEHAVIOR

1. Start with assessment of hearing, physical health, cultural background, classroom observation, and IQ. Determine that hearing capabilities, physical health and IQ are adequate, and that there are no classroom disturbances or social relationships that explain fidgety, tense, and hyperactive behavior and that cultural background would not prevent behavioral modification techniques from being applied. These assessment recommendations are similar to those for distracting and disrupting behavior above, but more emphasize is placed on medical screening for organic causes of hyperactivity.

2. In addition to the recommendations for modifying distracting and disrupting behavior, some behavioral modification techniques that could be applied are: (a) Rewarding quite periods with attention and praise; (b) reward in-seat behavior in class; (c) set up a program with parents to reward child with special time with them at home for assignments completed in a seat.

3. Give emotional support and reduction of demands if child seems over anxious.

Table 7. FACTOR 7: ARTICULATION PROBLEMS

FACTOR NAME	PERCENTAGE OF VARIANCE	CONTRIBUTING ITEMS	FACTOR LOADINGS
Articulation problems	4.8	Articulation errors	.69
		Stutters	.31

RECOMMENDATIONS FOR TREATING ARTICULATION PROBLEMS

1. Start with assessment of: Physical health, hearing, speech, other behavioral problems through observation in the classroom and evaluate any bilingual background. Since articulation errors tend to be a common develop mental problem normally outgrown do not overemphasize unless problem is outstanding.

2. If problem is severe, refer child to speech therapists for articulation training. Screen out children whose bilingual background would explain the type(s) of articulation problems prior to referral. Bilingual training program might be appropriate.

3. Given that nor organic or cultural influences cause the articulation problems, some behavioral modification approaches that might be used are:
   (a) shaping better pronunciation;
   (b) providing modeling of correct pronunciation;
   (c) ignoring stuttering, praising good performance (non-stuttering); and
   (d) set up a program at home incorporating these features.

4. Environmental changes might be:
   (a) reducing stress, and
   (b) exposure to examples of good English (e.g., TV documentaries).

Table 8. FACTOR 8: SOCIAL PROBLEMS

FACTOR NAME	PERCENTAGE OF VARIANCE	CONTRIBUTING ITEMS	FACTOR LOADINGS
Social problems	4.5	Complete follower Shy or withdrawn Slow tempo Lacks self-confidence	.53 .52 .45 .42

RECOMMENDATIONS FOR TREATING SOCIAL PROBLEMS

1. Start with assessment of physical health, and social and cultural assessment (e.g., lack of assurance may be due to cultural differences or shock) by family interview and observation of child. If not a problem to family or child consider not treating.

2. Environmental-social changes might be:

   a) providing supportive, structured activities

   b) involve child in easy interactive games

   c) integrate child into selective group of peers chosen for supportive, friendly behavior

   d) have parents provide special times for child

   e) create milieu and play activities which encourage successful leadership roles, assertive behavior

   f) encourage pairing with more socially outgoing child

   g) use a Magic Circle (affective education) to increase social involvement and leadership confidence

   h) encourage child individually to be more assertive and outgoing

   i) use role playing or behavioral rehearsal to prepare child for social situations that must be handled

   j) use doll playing and analogy through stories to encourage to be more outgoing

3. Reinforce successful outgoing, leadership behavior.

Table 9. FACTOR 9: POOR PERSISTENCE

FACTOR NAME	PERCENTAGE OF VARIANCE	CONTRIBUTING ITEM	FACTOR LOADING
Poor persistence	4.1	Poor persistence	.60
		Lack self confidence	.34

RECOMMENDATIONS FOR TREATING POOR PERSISTENCE

1. Start with assessment of physical health, dietary intake, family habit patterns (e.g., sleeping patterns and demands put on child), and cultural influences.

2. Environmental-social changes might be: Build positive and caring relationship with child so as to have influence and reinforcing value (e.g., greet warmly in morning, spend more time than usual helping child, praise positive behaviors, etc.)

3. Given that persistence problems are not explained by health, dietary influences, etc. behavioral modification approaches that can be tried are:

   a) initially using easier materials so there is more chance for success

   b) establish contingency contracts so the child will be rewarded if he finishes his work, but start with easy, small steps so that in effect the process is initially rewarded, then gradually increase the number of steps to earn a given reward until a task need be completed for a reward.

Table 10. FACTOR 10: CLUMSINESS

FACTOR NAME	PERCENTAGE OF VARIANCE	CONTRIBUTING ITEMS	FACTOR LOADING
Clumsiness	3.2	Clumsy or jerky	.49
		Poor manual dexterity	.44

RECOMMENDATIONS FOR TREATING CLUMSINESS

1. Start with assessment of physical health (including neurological) and motor skills, and have occupational therapy work up.

2. Environmental changes might consist of:

   a) avoiding excessive demands or criticisms; providing activities that may improve motor skills, but which do not emphasize achievement (e.g., dancing)

   b) develop program with occupational therapists

   c) have occupational therapist implement a program

3. Behavioral modification techniques that can be tried are: reinforce small improvements in simple tasks and gradually increase the complexity of tasks in a step-by-step fashion.

Table 11. FACTOR 11: PEER DISLIKE

FACTOR NAME	PERCENTAGE OF VARIANCE	CONTRIBUTING ITEMS	FACTOR LOADING
Peer dislike	2.7	Dislike by Peers	.51

RECOMMENDATIONS FOR TREATING PEER DISLIKE

1. Start with assessment of reasons why there is peer dislike by observing child in class, learning about cultural conflicts, and determine what behaviors or situations lead to rejection.

2. Environmental changes might consist of:

   a) providing suggestions to encourage child toward more positive functioning

   b) use social games (e.g., Magic Circle) to involve child with others

   c) put child with peer that has the best, estimated chance of being attracted to child

   d) set up activities where two children have to work together cooperatively

   e) have child tutor other children where he/she is strong

   f) use show-and-tell time so that child may come to know peers better and vice versa

3. Behavioral modification techniques that can be tried are:

   a) positively reinforce (praise, give candy, privileges, etc.) positive social behavior (skills) especially gradually increasing interactive behavior with peers

   b) perhaps use time out for aggressive behavior

   c) reinforce other children for including child